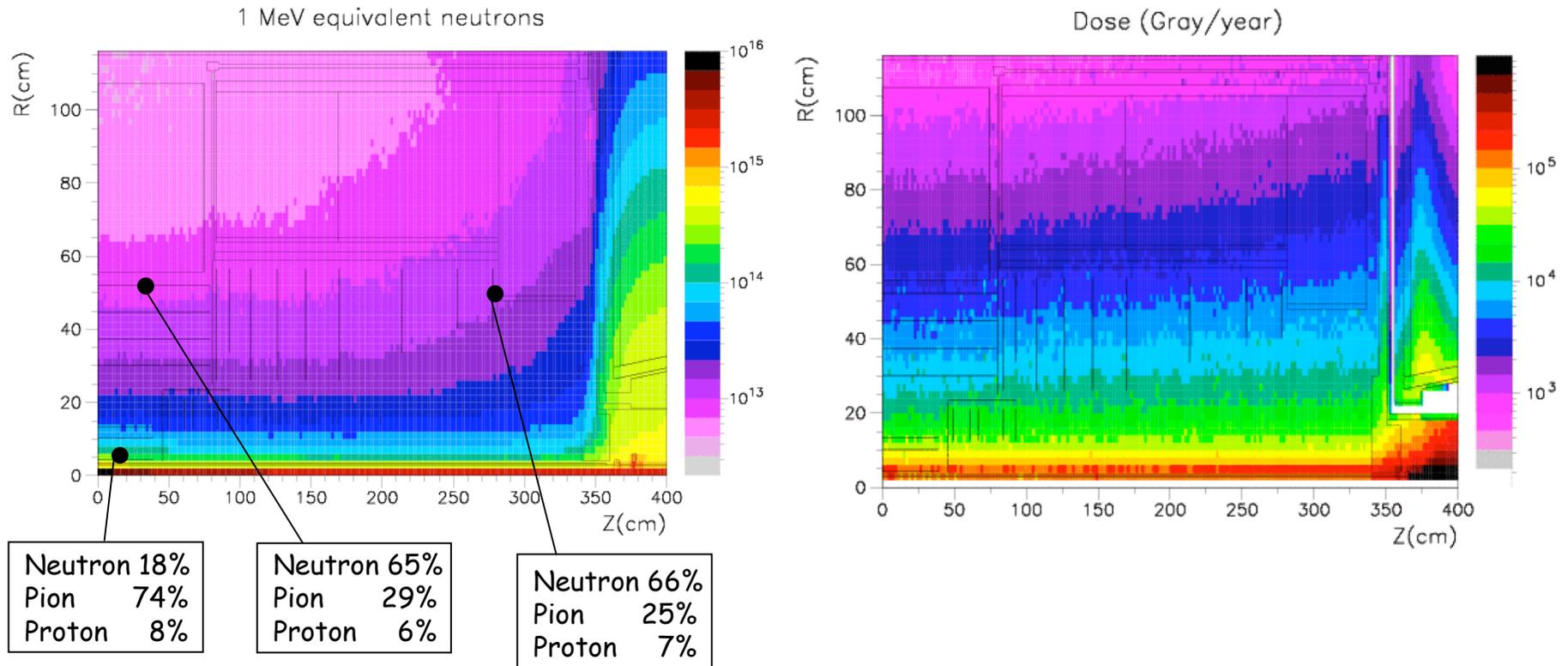


Simulations in Pixel region (done by me) using standalone FLUKA2001

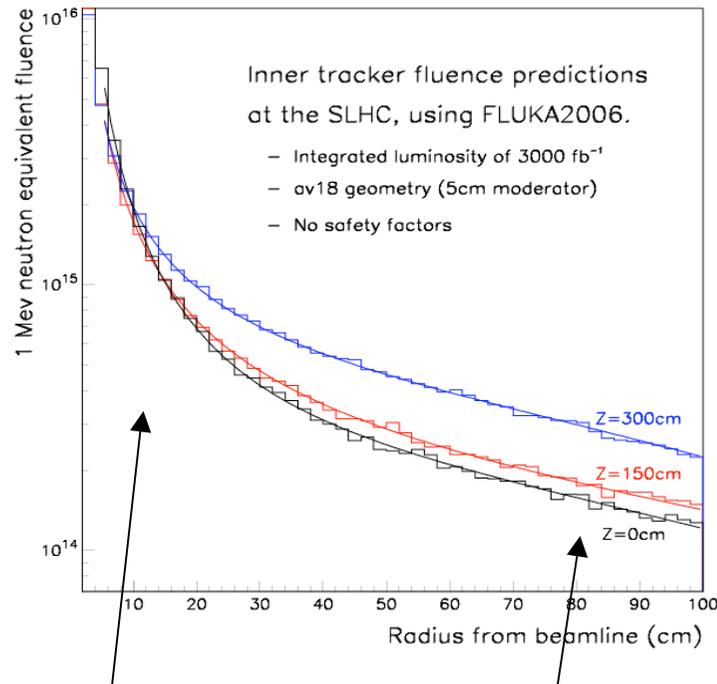
- Most information found in Radiation taskforce report:
http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/RADIATION/RadiationTF_document.html
- For ID volume, obtained:
 - 1) Integrated fluences and doses in 2cmx2cm bins
 - 2) Fluences at some boundaries (for Pixels, looked at B0 and B2).
- No new simulations performed since RTF report. Do we have enough information from past studies or are new simulations required?

2 • Particles from pp interaction dominate radiation backgrounds in Pixel regions



- Note, contours parallel with z-axis
- Is 2cmx2cm grid fine enough for Pixel regions? (Note my studies were biased towards SCT)
- These data files available if required.
- Can parameterise these data.

Parameterising colour plot fluences?



- I did this for SCT upgrade study:

$$\Phi(r) = \frac{a_1}{r^2} + \frac{a_2}{r} + a_3 + a_4 \cdot r$$

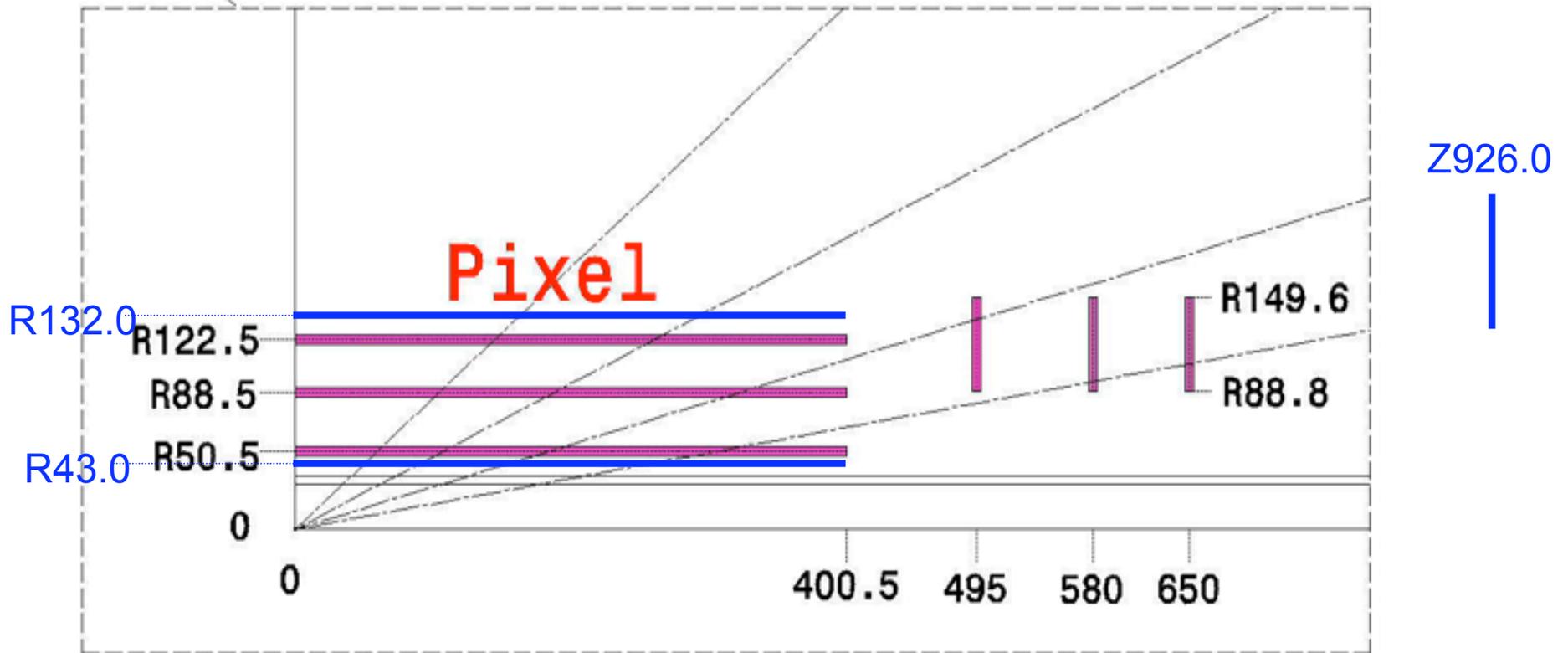
Z(cm)	a_1	a_2	a_3	a_4
0	1.4×10^{17}	3.7×10^{15}	1.7×10^{14}	-1.0×10^{12}
150	7.0×10^{16}	9.5×10^{15}	9.7×10^{13}	-5.7×10^{11}
300	4.9×10^{16}	1.2×10^{16}	3.0×10^{14}	-2.0×10^{12}

- Use these types of plots for future investigations? (Eg moderator design, impact of extra material etc.)

- Note: this parameterisation above not suitable for Pixels because skipped first few bins in fit.

4

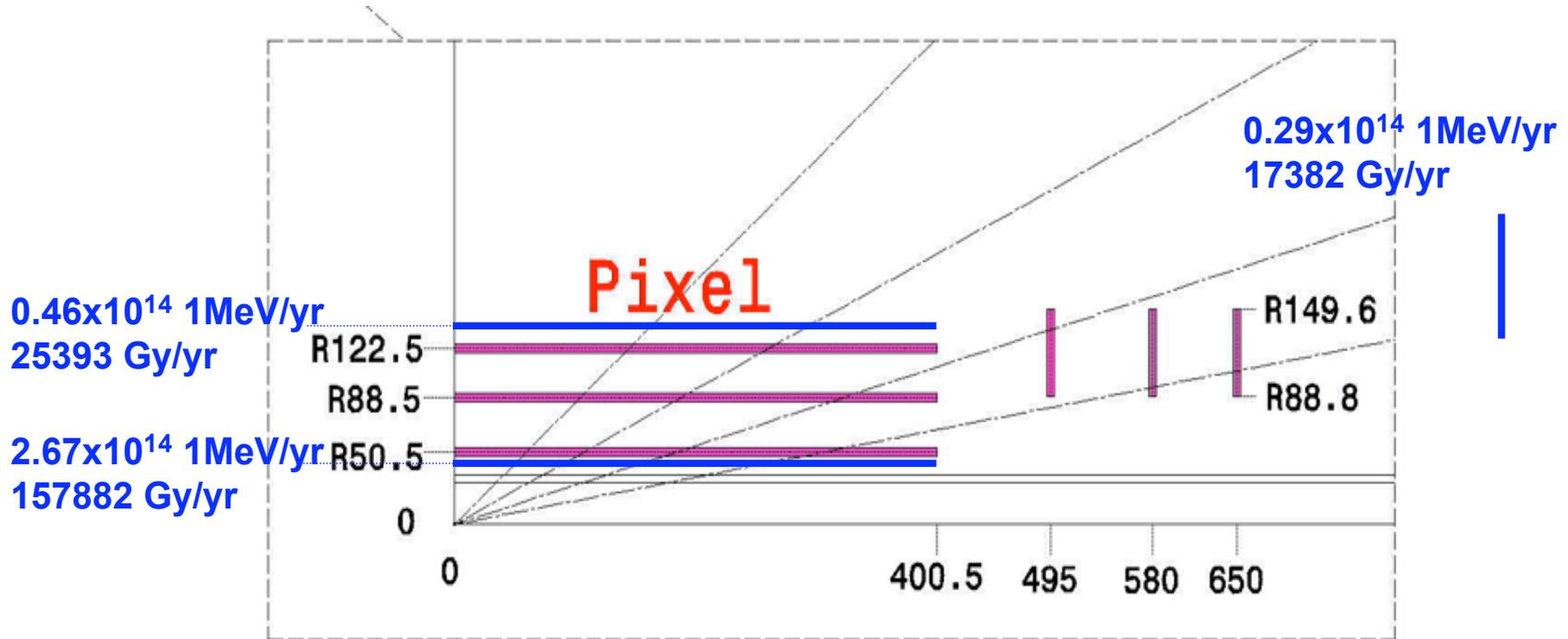
- **What about fluences obtained at boundaries?**
- Shown in blue are positions where average fluences were obtained. Compare to today's geometry.



- Fluences are averaged over boundaries (note for barrel very little variation along Z).

5

- Predicted fluences and doses in Pixel regions
- 10^{34} pp $\text{cm}^{-2}\text{s}^{-1}$ and 10^7 seconds per year..



- Recently looked at ID fluences with AthenaG4 and compared with FLUKA predictions - good agreement for PixB0.
- Use maximum value? Obtain other fluences from maximum value? (Eg $a_1/r^2 + a_2/r + \dots$ etc.)
- Or re-simulate?

To summarise

- FLUKA fluence and dose predictions available, but should really be updated for Pixel region. Current predictions are probably overestimates.
- If new predictions required, two options?
 - 1) Simplest! Take existing numbers - use maximum values to be conservative, or parameterise if more accuracy required.
 - 2) Simulate with “new” geometry with correct scoring surfaces etc. Clearly best solution if precision required.
Would require:
 - Someone to provide me with geometry (radii, thicknesses, material density etc.)
 - A couple of days of my time. Can't do in next few weeks. One possibility is that in about a month's time I have to teach someone FLUKA - I could use Pixel example as a training project.